
Bioenergy *UPDATE*

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New Non-Thermal Biomass Dryer



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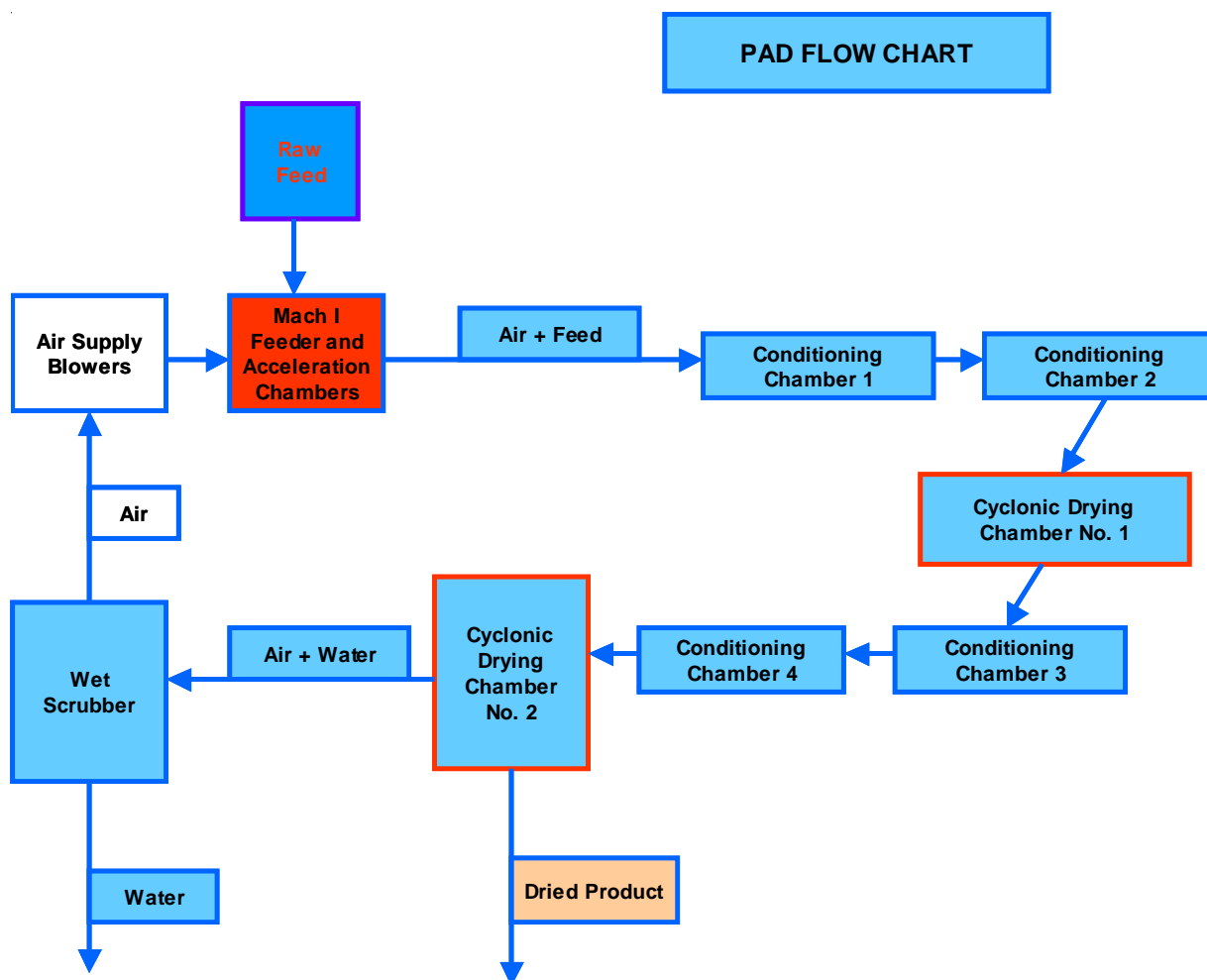
On the Cover: A picture of
GulfTex's PAD system. The
cyclone on the rear left is drying
chamber No. 1. The cyclone in
the center is drying chamber No.
2 and the small chamber on the
right is the conditioning chamber.



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New Non-Thermal Biomass Dryer

A novel, highly efficient non-thermal biomass dryer is quietly breaking new ground in America. Developed by GulfTex Environmental Services, LLC, out of Cleburne, Texas, the patented Pulverizing Air Dryer (PAD) technology is finding uses in a wide variety of applications. The PAD, which doesn't use heat, can cost-effectively dry materials from 80 percent initial moisture down to 10 percent final moisture.

As shown in the above figure, the PAD technology differs significantly from the typical thermal dryer. With thermal drying, it does not matter what form the water is in—it requires 1,200 Btu to dry each pound of wa-

ter. The PAD technology uses high velocity air streams to first accelerate and then collide the particle streams undergoing drying. These particle streams can range from large rocks to sludge material.

There are three kinds of moisture in materials that the PAD can affect—surface, loose matrix bound, and intracellular. With the PAD's physical drying, the surface moisture is the easiest to remove and separates in the acceleration lines. The impact compression in the initial conditioning chambers removes the water in matrix boundary. Following this, the shearing caused by the angular impact in the pulverizing conditioning chambers removes the intracellular water. The centrifugal "drying"

chamber at the end then separates the material by density, with water coming out the top and dry fiber or powder out the bottom.

The PAD was first developed for use in the non-thermal drying of agricultural byproducts. This particular application required the processing of large volumes of materials and the focus of GulfTex's technical team was to develop a means to process volumes of 20 input tons per hour and higher. Earlier versions of non thermal dryers were limited to one ton per hour or less and were far too energy intensive to be economical.

For agricultural byproducts, the PAD, by being able to create a high volume of uniform particle size from any solids, allows any fibrous agri-

cultural by-product to be converted into an attractive carrier / bait / fertilizer combination for the many natural biocides on the market. For livestock facilities, the PAD is able to pulverize and dry the end products resulting from conventional waste treatment facilities as well as the waste byproducts from livestock processing and rendering facilities. DAF float, digester solids, rendering fat and viscera have all been successfully pulverized and dried.

By being able to dry agricultural manure at high volumes, the PAD allows for the conversion of the manure into product that can be competitive in many areas such as:

- Fertilizer: \$ 40 / ton for high strength fertilizer, densified to 70 lbs / CF and odor free.
- Composite: \$ 80 / ton as a binding agent for composites and structural elements.
- Carrier Agent: \$ 50 to \$ 80 / ton as inert carrier for pesticides and herbicides.

The PAD has successfully dried feedlot, dairy, poultry and swine manure from an input of 80 percent Moisture cake to an output of 20 percent Moisture powder and drier, in commercial scale volumes.

The PAD has been successful in crop stalk pulverizing and other operations where its low cost and high volume capacity allows it to be competitive against virgin materials.

GulfTex has completed tests on using the PAD technology for drying poultry layer manure. Company officials say the results were spectacular. Despite driving the moisture from a 70 percent to a 17 percent level, the protein and fat content remained essentially unchanged. Additionally, the bacteria in the manure were over 90 percent destroyed. Subsequent additional tests from an independent laboratory confirmed the initial data.

The PAD technology is finding a special niche for drying distillers dried grains (DDGS) from ethanol plants.

Use of the PAD technology significantly reduces the requirements for natural gas, which is becoming an increasingly expensive commodity. A 48 million gallon per year state of the art ethanol mill will use the equivalent of 456 million Kwh / year to dry the DG from that mill. By contrast, the PAD will use 34 million Kwh to dry the same volume.

Secondly, because drying is accomplished at low temperatures, emissions of volatile organic compounds (VOCs) and NOx is reduced by up to 85 percent, and odor from DDGS drying operations is not a problem.

For instance, a 40 million gallon per year will create a minimum credit of 46,000 tons per year of CO₂. This does not take into account the natural gas used in the Thermal Oxidizers to oxidize the VOC's created by a thermal drying system. Nor does it take into account the other gases created by the thermal drying of the DDGS.

For example, a thermal dryer creates 4,000 to 5,000 tons per year of VOC's which must be burned. By contrast, the PAD produces less than 50 tons per year in drying the same volume.

Many of the planned ethanol plants are the 100 million gallons per year size in which case the CO₂ credit would be 115,000 tons per year. The PAD would save such a mill \$1,750,000 annually in drying costs plus provide another \$350,000 in CO₂ credits.

In addition to CO₂, the PAD can reduce sources of NOx to non-detect levels, whereas a thermal dryer produces several hundred tons per year of NOx. This creates even greater value to the mill and makes environmental permitting easier. Heartland Grain Fuels, LP, in Huron, South Dakota, is a grain ethanol plant that has implemented the PAD technology.

Even greater opportunities exist

for paper mills. The PAD's biggest benefit to paper mills is the economical drying of an average of 400 tons per day of primary and secondary sludges, creating a credit of about 15,000 tons per year of CO₂.

Most paper mills try to dewater the combined primary and secondary sludge to as low a moisture content as they can and then burn the thickened sludge in their boilers. The high moisture (55 % and greater) content means that the sludge requires more Btu than it generates.

By contrast, the PAD can dry this sludge at a cost savings of 30 % and create a material that can be burned as a fuel due to the 20 % Moisture content or less.

Some paper mills landfill their sludge, but this process is even more expensive.

In addition to the drying advantage, the PAD can produce a dried paper mill sludge that can be used in several commercial applications not feasible with thermal dried sludge. We have one open purchase order for 100,000 dry tons / year at \$ 50.00 per ton for the PAD processed sludge.

The CO₂ credits will be another bonus. In addition to CO₂, the PAD can reduce secondary sludge sources of NOx by up to 85 percent creating even greater value to the mill. The additional advantage is the comparative capital cost of achieving CO₂ reductions. One major chemical company was spending \$ 20 million per plant to achieve a 125,000 tons per year reduction. A PAD system achieves the same reduction for less than \$ 3.5 million while providing the plant sizable operating costs savings.

Many other industries such as mining and food processing use substantial natural gas for drying and are good candidates for the PAD technology.

A final bonus of the PAD technology is that since it is endothermic (a process that absorbs heat), it can

also be used for cooling applications. Thus GulfTex is also looking for applications where chilling or cooling is needed. This will create additional benefits to the industrial user.

For additional information contact John Teague, President, GulfTex Environmental Services LLC, PO Box 2289, Cleburne, TX 76033, phone +1 (817) 239-6661, email jet@gulftex.net

Section 45 Electricity Credit—Focus on Open-Loop Biomass

The Section 45 renewable resource electricity credit is a production tax credit for kilowatt hours of electricity generated and sold from qualified renewable resources. As originally enacted in 1992, qualified resources included only wind and closed-loop (or dedicated crop) biomass. Section 45 was expanded in October of this year, and now includes power from wind, closed-loop biomass, open-loop (or waste) biomass, geothermal, solar, municipal solid waste, and landfill gas, as well as refined coal sold for steam production. The co-firing of closed-loop biomass with coal may also qualify in certain circumstances. The credit rate for wind, closed-loop biomass, geothermal, and solar is 1.8 cents per kilowatt hour, and the rate for the other qualified resources is at one-half of this amount, or 0.9 cents per kilowatt hour (except for refined coal, which qualifies for \$4.375 per ton). The 1.8 cent

rate adjusts annually for inflation, rounded to the nearest one-tenth cent, and the 0.9 cent rate is always equal to one-half of this inflation-adjusted amount. Specific facts regarding open-loop biomass are shown in the table on page 3.

The term "open-loop biomass" includes any of the following wastes and by-products:

1. Agricultural livestock bedding material, such as wood shavings, straw, and other litter for disposition of manure; or
2. Segregated, solid, nonhazardous, cellulosic waste from wood and crops as follows:
 - (a) Forest-related resources, including mill and harvest residues, thinnings, and brush;
 - (b) Solid wood waste, including pallets, crates, manufacturing and construction waste wood, and landscape/right-of-way trimmings, but excluding: (i) pressure-treated, chemically treated, or painted wood waste, (ii) municipal solid waste, (iii) commonly recycled paper, and (iv) gas from biodegradation of solid waste; or
 - (c) Agricultural crop by-products or residues.

Municipal solid waste (MSW) does not qualify as open-loop biomass, but it does qualify for the 0.9 cent credit rate over a 5-year term, under two separate categories: (i) landfill gas recovery and (ii) MSW combustion. Unlike open-loop wood

and crop residue facilities, however, MSW power plants must be placed in service after the date of enactment (pre-existing MSW facilities do not qualify). The in-service deadline for MSW facilities is by the end of 2005, the same as for open-loop biomass.

Co-firing open-loop biomass with fossil fuels does not qualify for Section 45, beyond the amount of fossil fuel required for startup and flame stabilization. Only closed-loop (dedicated crop) biomass may be co-fired under limited circumstances as a qualified resource. An existing power plant may be modified to co-fire closed-loop biomass with coal or other biomass, but only if the modification is approved under the Biomass for Rural Development Programs, or as a pilot project of the Commodity Credit Corporation. In co-firing operations, only the power generated by the thermal input of the closed-loop biomass qualifies for credit.

At the rate of 0.9 cents per kilowatt hour, a Section 45 biomass power project may produce approximately \$75,600 in annual credit per megawatt hour. Accordingly, a 10 megawatt power plant could produce over \$750,000 in credit annually, which over the 5-year term comes to more than \$3.75 million. The estimate is as follows:

10 Mwh Plant: 1,000 Kwh x \$0.009 x 10 = \$90/hr x 8,400 hrs/yr = \$756,000 per year

Qualified Resource	In-Service Dates	Credit Term	Credit Rate
Open-Loop Biomass: <ul style="list-style-type: none"> Wood Residues Crop Residues Livestock Bedding Facilities with Capacity not less than 150 Kwh 	<ul style="list-style-type: none"> For Wood and Crop Residues – Anytime before 2006 (New and Pre-existing Plants Qualify) For Livestock Bedding – After Enactment Date and before 2006 	5 Years from Later of Enactment Date or In-Service Date, for Power Sold after 2004	0.9 Cents/Kwh, 2003-04 Rate, Adjusted Yearly for Inflation

This amount should increase each year due to annual inflation adjustments. The credit may be reduced by up to one-half if government grants, tax exempt bonds, or subsidized energy financing are used to fund the project. Also, a project that has used the Section 29 "nonconventional" fuels credit may not claim the Section 45 credit, and Section 45 does not apply to certain pre-1987 premium rate utility contracts.

For electricity to qualify under Section 45, the producer must sell the power to an "unrelated" party, defined as a party outside the controlled group of the producer. In a parent-subsidiary structure, the parent must own no more than 50% of the subsidiary in order to qualify as "unrelated." Therefore, an outside partner must own 50% (or more) of the power producer for power sales between the parent and subsidiary to qualify. If the facility is leased to the power producer, the producer receives the credit, not the owner/lessor of the facility. This differs from investment credits and tax depreciation that may be allocated to a facility title owner/lessor.

(This article prepared by: Greg Sanderson, Power Management Alternatives, LLC, Suite 535, 2000 Powers Ferry Road, Marietta, Georgia 30067, +1 (770) 952-1310, fax 770-953-3021.)

Broin Companies Announces Ethanol Technology Revolution

The Broin Companies recently announced the creation of a revolutionary new patent pending technology for ethanol production that eliminates a costly energy consuming cooking step in the process. The "Broin Project X" (BPX) process not only reduces energy costs, but also releases additional starch content for conversion to ethanol, increases pro-

tein content and quality of byproducts, increases byproduct flowability, potentially increases plant throughput, and significantly decreases plant emissions.

Jeff Broin, CEO of the Broin Companies, stated, "The BPX process may be the biggest breakthrough in starch conversion to ethanol in more than 100 years. We have already implemented the process commercially in three major U.S. ethanol plants with excellent results."

The BPX process was developed in Broin Companies laboratories and optimized in Broin's production scale research facility. Broin filed patents for the BPX process and for use of enabling enzymes for this revolutionary new conversion system. After consulting with several enzyme technology providers on the BPX process, Novozymes, a major developer and marketer of starch conversion enzymes to the ethanol industry, was chosen to partner on the project due to their track record of developing advanced enzyme technologies. The collaboration resulted in the development of new enzyme products that enhance the BPX process.

Broin states, "We have overcome dozens of major hurdles and incurred considerable downtime and expense in our wholly owned research facility over a three year period and have created a process that will change ethanol production as we know it today. It is our intention to license this technology to the ethanol industry worldwide."

The Broin Companies are a highly specialized and integrated technology development, production and marketing company in the ethanol industry. As the second largest producer in the industry the Broin Companies have designed and constructed 19 operating ethanol plants and currently have 5 more under construction or development. The Broin Companies manage, produce and market more than 600 million gallons

of ethanol annually and employ an aggressive growth strategy, adding 100-200 million gallons each year through new design and construction.

For more information, contact Larry Ward, Dir. Of Project Development, Broin Companies, 2209 East 57th St. N., Sioux Falls, SD 57104, phone +1 (605) 965-2200, fax (605) 965-2203, email larryward@broin.com.

CAST Issue Paper— Bioenergy: Pointing to the Future

Reliable, low-cost energy is important for a prosperous U.S. economy. For more than a century, fossil sources have satisfied the majority of the nation's energy needs. But there is growing awareness and concern that reliance on fossil resources for the majority of the large, ever-increasing U.S. energy consumption needs is not sustainable and potentially has serious security, environmental, and economic consequences.

An important theme of the Bush Administration's National Energy Policy Development Group's recommendations and of the energy legislation now being debated in Congress is the need to expand and diversify U.S. energy supplies. Bioenergy is being mentioned more frequently and is playing a more important role both in the Administration's recommendations and in congressional debate.

The U.S. Department of Energy's (DOE) Energy Information Administration reports that in 2002 the United States consumed 97.7 quadrillion British thermal units, 86% of which came from fossil sources. This amount included 136 billion gallons of gasoline and 36 billion gallons of diesel fuel, 60% of which came from imported oil. Consumption of fossil fuels has grown to its present level because oil is a low-cost raw material and because a well-developed infrastructure is in place to extract,



GAO reckons that the additional cost of imported gasoline that consumers do not see at the pump is approximately \$3 per gallon.

transport, and refine oil, as well as to distribute and market liquid fuels (primarily gasoline and diesel fuel) made from oil. Because the consequences of a disruption in U.S. access to its imported oil supply are extensive (as evidenced during the oil embargo of the 1970s when 30% of U.S. petroleum needs were met by imports), significant amounts of money and effort are spent to maintain an uninterrupted flow of oil.

Even if domestic and imported oil is adequate to meet U.S. needs, there are other concerns. Each gallon of gasoline and diesel fuel burned emits into the atmosphere nearly 2.5 kilograms of carbon, previously stored underground. The cumulative effect of emissions from burning fossil fuels for transportation, heat, and power is the main cause of the recent large increase in carbon dioxide concentrations in the atmosphere. The potential climate-modifying consequences of this increase are of great concern.

Air and water quality concerns also motivate interest in bioenergy. The current U.S. Clean Air Standards require oxygenates for the wintertime carbon monoxide program and the reformulated gasoline programs, all of which are national programs designed to decrease carbon monoxide and smog pollution. Oxygenates are fuel additives that add extra oxygen to gasoline so when burned, carbon monoxide and smog are decreased. But the petroleum-based oxygenate called methyl tertiary butyl ether (MTBE) has been found to leak into groundwater, leaving an odor and foul taste. As a result, MTBE has been banned in 17 states. Ethanol, a biobased oxygenate, does not have similar contamination problems and when mixed with a special blendstock of gasoline, meets the standards for reformulated gasoline. Certain policymakers have asked whether ethanol can replace MTBE adequately. A study conducted by the Office of Energy Policy and New

Uses (OEPNU) for Senator Harkin from Iowa showed that a 4-year adjustment period is sufficient to enable ethanol production and distribution capacity to expand to meet the projected increase in demand. Current ethanol production increases bear out the findings of the OEPNU study. The U.S. Department of Agriculture (USDA) is predicting 3.5 billion gallons of ethanol will be produced in 2004. The Harkin study projects that the ethanol production increase would raise net farm income by approximately \$12 billion, cumulatively, over an 11-year period.

The use of bioenergy will decrease adverse greenhouse gas (GHG) emissions compared with the use of fossil fuels. An analysis by Argonne National Laboratory in Illinois showed that in the near future, corn ethanol production and use could decrease GHG emissions by 30% versus gasoline, and the use of cellulosic ethanol could decrease emissions by more than 80%. A joint USDA-DOE study showed that biodiesel use decreases net carbon dioxide emissions by 78% compared with petroleum diesel use. Linked to this research is the fact that corn ethanol has a positive net energy balance of 67%.

...the United States positions approximately one-third of its military forces, directly or indirectly, to ensure the free flow of oil.

Research to enhance biomass crop yields and improve conversion and power generation technologies will allow bioenergy to compete more effectively with fossil fuels. But unless government policies are put in place to include the indirect energy security and environmental costs of fossil fuel consumption in the price

consumers pay for fuels, bioenergy will continue to be too costly for the foreseeable future. The reason policies are needed is because the net positive externalities of bioenergy are not accounted for in the marketplace.

Some policymakers cite the federal assistance that ethanol receives as evidence of the fuel's high cost. Although it is true that ethanol received a tax credit of 52 cents a gallon in 2003, imported gasoline also received significant financial assistance. Energy security is a major national concern. Four top policymakers, including the former Chair of the Joint Chiefs of Staff Admiral Thomas H. Moore, wrote to Congress that the United States positions approximately one-third of its military forces, directly or indirectly, to ensure the free flow of oil. In a 1990 study for Congress, the U.S. General Accounting Office (GAO) reckoned that the additional cost of imported gasoline that consumers do not see at the pump is approximately \$3 per gallon. Another GAO report documents the fact that the U.S. oil industry received tax benefits of \$134 billion (in year-2000 dollars) from 1968 to 2000. Even the American Petroleum Institute estimates that ethanol blending has decreased the price of finished gasoline by 0.27%.

Composed of five stand-alone pieces, this Issue Paper highlights the current science, processes, and potentials for energy production through agriculture and outlines future research needs.

A. Introduction to the Bioenergy Issue: As Congress debates the need to expand and diversify U.S. energy supplies, nonfossil sources of energy, including bioenergy, must be considered. Perennial biomass crops could become important, environmentally sound feedstocks for power, liquid fuel, and chemical production, creating new income opportunities for farmers.

B. Technology of Bioenergy:

Successful future research depends on accurate assessments of past information, adequate funding, both broad and specific research focus, clear and consistent research priorities, and multi-institutional, interdisciplinary cooperation to assure effective design and evaluation.

C. Economics and Rural Development of Bioenergy: Research in biomass and traditional crop conversion technology could decrease the cost of bioenergy and industrial products and broaden the resource base for import substitution.

D. Environmental Effects of Bioenergy: Although there is proven technology to convert biomass to energy, a major challenge is to make sure that implementation is carried out in an economical and resource-conserving manner. Potential effects on land use, air quality, and wildlife must be addressed.

E. Penetrating the Commercial Marketplace with Bioenergy: The process of bringing new products to market may be viewed as consisting of links in a causal chain extending from the research bench to its product prototypes to acceptance and penetration.

This article is taken from CAST Issue Paper No. 27, titled Bioenergy: Pointing to the Future. Additional copies of the complete issue paper are available for \$5.00 from the Council for Agricultural Science and Technology, 4420 W. Lincoln Way, Ames, Iowa 50014; Phone: +1 (515) 292-2125; Fax: 515-292-4512; E-mail: cast@cast-science.org; Linda M. Chimenti, Managing Scientific Editor. World Wide Web: <http://www.cast-science.org>.

Sustainable Energy Coalition Applauds Colorado Ballot Initiative 37 Establishing A Renewable Energy Requirement For The State

(Calls Renewables-By-Initiative A Model For Other States To Consider)

The undersigned 21 businesses, environmental, energy policy, and other member groups of the Sustainable Energy Coalition recently applauded Colorado's Ballot Initiative #37 as a critical step for stabilizing energy rates and strengthening economic and homeland security in the state.

The initiative would require the state's largest utilities to obtain 10% of their electricity from cost-effective renewable energy resources by 2015 as well as establish a standard net metering system for homeowners and ranchers with small photovoltaic systems to connect to the power grid.

The organizations noted that while Colorado is endowed with abundant solar, wind, biomass, geothermal, and hydroelectric resources, the state presently produces only 2% of its electricity from renewable energy. However, given renewable energy's potential to contribute to a cleaner environment and improved public health while creating new businesses and quality jobs, there is strong support for expanding the use of clean energy technologies in the state.

Inasmuch as Colorado's legislature has failed to act, Ballot Initiative 37 affords the citizens of Colorado an alternative means for moving the state's economy towards a cleaner energy future.

By any measure, Initiative 37, while a step in the right direction, is only a modest proposal. Already 16 other states have enacted renewable energy requirements for their utilities and many require a higher percentage of electrical generation to be from renewable energy than envisioned by Initiative 37.

New Mexico, for example, requires 10% renewable electricity by 2011, four years ahead of the Colorado proposal. Nevada requires 15% renewable electricity by 2013. New York State recently required that 25% of its electricity come from renewable sources by 2013. The Sustainable Energy Coalition itself has called for a national renewable energy standard directing that no less than 20% of the nation's electricity be generated by renewable energy resources by 2020 in addition to that already provided by hydropower.

The undersigned organizations also observed, in light of inaction by the federal government, that Ballot Initiative 37 offers a model for 18 other states which have the initiative process but do not yet have requirements for expanding use of renewable energy.

Signing Organizations:

Alliance for Affordable Energy
American Bioenergy Association
American Council for an Energy Efficient Economy
American Solar Energy Society
American Wind Energy Association
Bob Lawrence & Associates
Breakthrough Technologies Institute
City & County of San Francisco
Colorado Energy Group
Energy Innovations
Environmental and Energy Study Institute
National Environmental Trust
National Hydropower Association
Natural Resources Defense Council
New Community Project
New Uses Council
Solar Energy Industries Association
The Stella Group Ltd
SustainableBusiness.com
Union of Concerned Scientists
U.S. Public Interest Research Group

For more information, contact Marchant Wentworth, Union of Concerned Scientists, +1 (202) 223-5133, ext. 137.

The Sustainable Energy Coalition is a coalition of nearly 100 national

and state business, environmental, consumer, and energy policy organizations, which collectively represent several thousand companies and community-based groups. Founded in 1992, the Sustainable Energy Coalition works to promote increased use of renewable energy and energy-efficient technologies. They can be reached at 1612 "K" Street, NW, +202-A, Washington, DC 20006, +1 (202) 293-2898, ext. 201; fax (202) 293-5857.

Regulator's Handbook on Tradable Renewable Certificates

The *Regulator's Handbook on Tradable Renewable Certificates* was published in May 2003. Tradable Renewable Certificates (TRCs), the non-energy attributes of renewable energy, are an important vehicle for the development of renewable energy resources. As we continue to experience the detrimental effects of other types of generation, TRCs are providing a breath of fresh air.

As regulators and advocates for our citizens, we must continue to practice financial and environmental stewardship. The Center for Resource Solutions has worked diligently to bring forth an excellent tool, the *Handbook on Tradable Renewable Certificates*, for meeting these responsibilities.

The *Handbook* is an excellent reference and a useful tool for regulators, state energy offices, Attorneys General and consumer advocates. It provides, in an easy to understand way, the Basic Principles and Best Practices in the use of TRCs. As consumers continue to clamor for clean energy choices and as developers rely on cash flows from TRC sales, it will become increasingly important to understand and address these issues.

This Handbook provides valuable direction for issues we face, such as

pricing green power, fostering renewable resource development, implementing renewable portfolio standards, and ensuring accurate environmental disclosure. In addition to addressing these issues, the *Handbook* identifies regulatory issues that would benefit from further discussion and recommendations from the regulatory community.

As markets for green power develop, regulators must ensure that these markets function in an effective manner. Consumers must have confidence in the integrity of the product claims. Developers and purchasers of renewable resources must have a platform for transparent and fluid transactions. This *Handbook* will facilitate the development of these markets.

This *Handbook* provides information to renewable energy decision-makers regarding the development of the rapidly growing TRC market in the US and worldwide. We must embrace and support this community of decision-makers.

This *Handbook* recognizes the value of your time. The electronic version of the handbook has hyperlinks from the Table of Contents allowing users to go directly to specific sections that are relevant to the reader's interest. There are also hyperlinks from the text to the Glossary that allow the user to access the definition of new terms found in the text and then jump right back to the text and continue reading. The hard copy version is in loose-leaf binder format with tabs for easy reference.

TRCs are an exciting new tool that can provide a wonderful benefit for the further development of renewable generating facilities if applied in a responsible and thoughtful fashion. The Center for Resource Solutions has worked closely with the regulatory community to produce this tool. The TRC *Handbook* is available online at <http://www.resource-solutions.org/>

RegulatorHandbook.htm. You can also purchase a copy by contacting Regulator's Handbook, P.O. Box 29512, San Francisco, CA 94129, phone: +1 (415) 561-2100.

Passage of Clean Energy Bill Revolutionizes Electricity Industry

John Hanger, President and CEO of Citizens for Pennsylvania's Future (PennFuture) recently applauded the Pennsylvania legislature's approval of SB1030, the Alternative Energy Bill, and thanked Governor Rendell for his leadership in support of the bill.

"This bill puts Pennsylvania in the forefront of clean and renewable energy technology and development," said Hanger. "This legislation will create thousands of manufacturing and construction jobs, attract billions in private investment to Pennsylvania, stimulate local tax bases, help clean our air and water, provide incentives to reclaim piles of coal waste at abandoned mines, spur energy conservation and actually lower electricity prices by creating a greater, more diverse supply of electricity. It is excellent for the environment, great for the economy and a giant step in moving Pennsylvania's energy industry into the 21st Century."

The Alternative Energy Bill requires 18 percent of the electricity sold in Pennsylvania to come from renewable and advanced energy sources within 15 years. The bill sets up two categories of energy sources required to be used by all power companies selling electricity in Pennsylvania - Tier 1 energy sources including wind, solar and biomass and Tier 2 energy sources including energy saved from new energy efficiency measures and coal waste. Energy companies would have to obtain 8 percent of their power from Tier 1 resources and 10 percent of their power from Tier 2 resources.

"This bill is a major leap forward for Pennsylvania's environment," con-

tinued Hanger. "Under its provisions, we will have eight times more green energy—most of it wind power—than we have right now. That's enough to power more than one million homes. And there are guarantees for solar power, and protections against any source of energy that makes more pollution than we currently suffer. It calls for extensive energy efficiency and conservation measures, and it includes all electricity customers.

"Pennsylvanians should be proud of the legislators who fought for this groundbreaking legislation, especially Senator Ted Erickson (R-Delaware), the prime sponsor, Senator Mary Jo White (R-Venango), Senator Raphael Musto (D-Luzerne), Representative Chris Ross (R-Chester), who sponsored a similar bill in the House, Rep. Michael Veon (D-Beaver), Rep. William Adolph (R-Delaware) as well as Governor Rendell and Secretary of Environmental Protection Kathleen McGinty, who championed clean energy on all levels," continued Hanger. "Thanks to them, we have the first clean energy standard bill passed by a coal-producing state, and stronger legislation than New Jersey, Maryland and New York. With Governor Rendell's signature on this bill, Pennsylvania will be established as the region's strongest competitor for renewable energy development."

PennFuture is a statewide public interest membership organization that advances policies to protect and improve the state's environment and economy. PennFuture's activities include litigating cases before regulatory bodies and in local, state and federal courts, advocating and advancing legislative action on a state and federal level, public education and assisting citizens in public advocacy. PennFuture has offices in Harrisburg, Philadelphia and Pittsburgh.

Alternative Energy 101 on DVD—An Introduction to Manufacturing Fuel Cells & Advanced Batteries

This DVD set, recorded at the Advanced Energy and Fuel Cell Technologies conference sessions, consist of programs presented by experts in the field, and provide fundamental information with detailed descriptions of alternative energy. Watching these DVDs will help you demystify and deconstruct fuel cells and other alternative technologies.

This 2-DVD set focuses on Alternative Energy 101. Topics include An Overview of AET; Renewable Energy 101; Fundamentals of AET; An Introduction to Fuel Cells; Production Scale-Up of AMTEC Manufacturing Processes; The Advanced Stored Energy System's Dilemma; Portable Solid Oxide Fuel Cells; and AET 101 Q&A Session. Cost is \$410; or \$329 for members of the Society of Manufacturing Engineers. To order, phone (800) 733-4763 (U.S. only), or +1 (313) 271-1500, Ext. 4500, or fax +1 313 425-3401; or mail your order to Society of Manufacturing Engineers, Attn: SME Resource Center, PO Box 6028, Dearborn, MI 48121-6028; or visit www.sme.org. Use Order Code DV04PUB16-4901.

Handbook on Sugar Mill Cogeneration in India

This handbook, prepared by Winrock International India (WII), is a one-stop guide providing the preliminaries of cogeneration to interested sugar mills. The preparation was funded by USAID-India through its agreement with the U.S. Department of Energy's National Energy Technology Laboratory on the GEP-ABC component.

The first chapter begins with an overview of the status of sugar mills, the agencies supporting cogeneration, the evolution of the technology, the suppliers of equip-

ment, and the economic and environmental merits of high-efficiency cogeneration, followed by an assessment of state-wise bagasse and other biomass resources in the second chapter, to give the reader an idea of the potential for new MW cogeneration capacity. The third chapter points out significant design aspects of a cogeneration plant, which include selection of the site, steam cycles, process configuration, and equipment identification and selection.

Project development for a new cogeneration plant with respect to preparation of Detailed Project Reports (DPRs), plant capital costs, and Power Purchase Agreements (PPAs), and typical operating and maintenance (O&M) practices are also highlighted. The final chapter contains case studies of three grantees (Shamanur Sugars, EID Parry and Ugar Sugars) under USAID's GEP-ABC component, focusing on design aspects, plant flow sheets, and equipment specifications. The appendices include a list of organizations and service providers involved in cogeneration, the International Cane Energy Network's Sugar Energy Data Protocol summarizing the methodology for evaluating the performance of a cogeneration plant, and a typical PPA for bagasse-based cogeneration plants.

Contributors include MITCON Ltd, Zenith Corporate Services, Avant-Garde Engineers and Consultants, Shamanur Sugars Ltd, Dimension Engineering Consultants, EID Parry (India) Ltd, Ugar Sugar Works Ltd, and the University of Hawaii at Manoa.

If you are interested in a copy, please contact Mr. PRK Sobhanbabu, Program Officer (E&E) at Winrock International India, 7 Poorvi Marg, Vasant Vihar, New Delhi 110 057 India, tel +91-11-2614-2965/66/67, fax +9-11-2614-6004; email winrock@vsnl.com; or visit their website at www.winrockindia.org.

Ending the Energy Stalemate—A Bipartisan Strategy to Meet America's Energy Challenges

This report, published by The National Commission on Energy Policy in December 2004, presents key findings from an intensive, three-year effort to develop consensus recommendations for future U.S. energy policy. Bringing together a diverse and bi-partisan group of leaders from business, government, academia, and the non-profit community, the National Commission on Energy Policy has sought to establish a constructive center in the often polarized debate about energy and to advance a coherent strategy for meeting the energy challenges of the 21st century that has the economic, environmental, and political integrity to overcome the current stalemate in national energy policy.

Key Challenges. The challenges that must be addressed are at once familiar and new. Long-standing anxieties about the nation's underlying energy security have resurfaced at a time of record high oil and gas prices and in the wake of the largest cascading power outage in U.S. history. Recent developments in world oil markets, including rapid growth in global demand and the emergence of terrorist threats to oil facilities, are bringing new urgency to perennial concerns about the nation's exposure to oil price shocks and supply disruptions. Similar price and supply concerns increasingly apply to natural gas markets where sustained price increases and extreme volatility have begun to signal a steadily widening gap between domestic supply and demand for this economically and environmentally valuable fuel. At the same time, the uncertain state of restructuring efforts in the nation's electric industry is prompting urgent questions about the prospects for needed investment in an infrastruc-

ture that is essential to nearly every facet of modern life.

All of these issues present formidable challenges in their own right, even as the inability of the 108th Congress to pass comprehensive energy legislation in 2003 and 2004 demonstrated the political difficulty of addressing them. Meanwhile, the overall picture is vastly complicated by the inescapable linkages between energy production and use and the environment. In particular, the risk of global climate change from emissions released by fossil fuel combustion will exert a profound influence on the world's energy options and choices over the decades ahead. In this context, the old notion of energy security acquires new dimensions. Reliable access to the energy resources needed to support a healthy economy remains the core imperative, but in the 21st century energy security also means reducing the macroeconomic and terrorism-related vulnerabilities inherent in the current geopolitical distribution of oil supply and demand and coming to grips with the environmental impacts of the current energy system.

Goals. This report sets forth the Commission's specific recommendations for addressing these linked objectives, beginning with oil security and climate change risks—arguably two of the most difficult issues for U.S. energy policy. Thus, the first chapter of this report describes a package of measures designed to improve U.S. oil security by increasing global oil supply and reducing growth in domestic demand. The next chapter proposes a mandatory, economy-wide tradable-permits system for limiting emissions of carbon dioxide and other greenhouse gases. The third and fourth chapters describe a set of complementary proposals for, on the one hand, substantially improving energy efficiency throughout the economy (i.e., in buildings, equipment, industry, and transporta-

Calendar of Events

January 10-11, 2005

Baltimore, Maryland
8th LMOP Conference and Project Expo
www.epa.gov/lmop/conf/8thconf.htm

January 13, 2005

Knoxville, Tennessee
Tennessee Biomass Information Network Regional Biomass Workshops
www.sare.org

January 13-14, 2005

New York, NY
Climate Change & Opportunities: Learning from the Leaders
 Email: robyn@ceepinc.org

January 19-21, 2005

Tokyo Big Sight, Japan
1st International Fuel Cell Expo
www.fcexpo.jp

January 24, 2005

Nashville, Tennessee
Tennessee Biomass Information Network Regional Biomass Workshops
www.sare.org

January 26, 2005

Sacramento, California
2nd Annual California Biomass Collaborative Forum
<http://conferences.ucdavis.edu/cabiomass>

January 31-February 2, 2005

Ft. Lauderdale, FL
Second National Biodiesel Conference & Expo
www.biodiesel.org

February 2-3, 2005

Ottawa, Ontario, Canada
BIOCAP Canada, Capturing Canada's Green Advantage
www.biocap.ca

February 7-9, 2005

Scottsdale, Arizona
10th Annual RFA National Ethanol Conference, Policy & Marketing
www.ethanolRFA.org

February 16-18, 2005

Albuquerque, New Mexico
WildLand Fire 2005
www.iafc.org

February 17, 2005

Jackson, Tennessee
Tennessee Biomass Information Network Regional Workshops
www.sare.org

February 23-24, 2005

Grand Forks, North Dakota
Renewable Energy in the Upper Midwest
www.undeerc.org/re

February 23-26, 2005

Atlanta, Georgia
Hearth, Patio, & Barbecue Expo 2005
www.hpbexpo.com

March 1-3, 2005

Las Vegas, Nevada
Power-Gen, Moving into the Mainstream
www.power-gengreen.com

March 2-3, 2005

Baton Rouge, Louisiana
Alternative Energy: The Future of Louisiana's Energy Industry?
 Louisiana State University Center for Energy Studies, Baton Rouge, LA 70803

March 9-11, 2005

San Francisco, California
Hart World Fuels Conference: San Francisco 2005
www.worldfuelsconferences.com

March 9-11, 2005

Clemson, South Carolina
Power Systems Conference
www.ces.clemson.edu/powsys2005

March 14-16, 2005

Sao Paulo, Brazil
Sugar and Ethanol Brazil
www.agra-net.com

March 15-17, 2005

Syracuse, New York
Dairy Manure Management: Treatment, Handling, and Community Relations
www.nraes.org

March 22-23, 2005

Jackson, Mississippi
Southern Bio-Products Conference
wes_miller_1@hotmail.com
duanem@ios.msstate.edu

March 29-April 1, 2005

Washington, DC
NHA Hydrogen Conference 2005—Partnering for the Global Hydrogen Future
www.hydrogenconference.org

April 2-6, 2005

Monaco
21st Worldwide Battery, Hybrid and Fuel Cell Electric Vehicle Symposium and Exhibition
www.evs21.org

April 7-8, 2005

Lexington, Kentucky
Kentucky Forest Industries Association Annual Meeting
www.kfia.org

April 20-22, 2005

Orlando, Florida
World Congress on Industrial Biotechnology and Bioprocessing 2005
www.bio.org/events

May 1-4, 2005

Palm Springs, California
AFVI 11th National Clean Cities Conference and Expo
www.afvi.org/palmsprings

May 1-4, 2005

Denver, Colorado
27th Symposium on Biotechnology for Fuels and Chemicals
www.nrel.gov/biotech_symposium

May 21-25, 2005

Beijing, China
2nd Asian Renewable Energy Fair and Conference (REAsia 2005)
www.re-asia.com

Calendar of Events (cont'd)

June 1-3, 2005

Chicago, Illinois
Greening the Heartland 2005: Cost, Practice and Policy
www.greeningtheheartland.org

June 12-14, 2005

Cody, Wyoming
15th Annual EPAC Ethanol Conference—Spurring Ethanol into the Future
www.ethanolmt.org

June 12-14, 2005

Point Clear, Alabama
Summit on the Rural South
www.southern.org

June 28-July 1, 2005

Kansas City, Missouri
2005 Fuel Ethanol Workshop & Expo
www.fuelethanolworkshop.com

June 29-30, 2005

Morgantown, West Virginia
Wood Biomass Conference
sgrushec@wvu.edu

June 29-July 1, 2005

Chicago, Illinois
Innovative Uses of Animal Manure and Biosolids—Developing and Marketing Innovative Technologies
www.wef.org

July 1-4, 2005

Guangzhou, China
Agritech China 2005
www.faircanton.com

August 6-12, 2005

Orlando, Florida
ISES 2005 Solar World Congress
www.asme.org/divisions/solar

October 17-21, 2005

Paris, France
14th European Biomass Conference and Exhibition
www.etaflorence.it

tion) and, at the same time, promoting energy supply options that advance a number of cross-cutting policy objectives, from reducing the nation's exposure to resource constraints and supply disruptions to reducing climate change risks.

Specifically, Chapter IV recommends a number of policies to help ensure adequate supplies of natural gas and to promote the expanded deployment of low-carbon energy alternatives—including advanced coal technologies with carbon sequestration, next-generation nuclear technology, and renewable sources for electricity production and transportation fuels. Recognizing that a robust and resilient energy infrastructure and healthy markets provide the necessary foundation for ensuring continued access to needed energy resources, Chapter V addresses the need to site critical infrastructure, protect key energy facilities from terrorist attacks, and improve the performance and reliability of the nation's electricity system. Finally, the Commission recognizes that continued technological advances are essential to ensure that clean, secure, and affordable energy will be available in the quantities required to sustain long-

term economic growth for the United States and the world. In Chapter VI, the Commission therefore recommends that the federal government promote technology innovation in both the public and private sectors by significantly expanding and refocusing federal energy research and development programs.

Policies That Work Together. It is important to emphasize that the Commission's various recommendations were designed to be mutually reinforcing and are intended to function as a package. Each component of that package is the product of extensive discussions and rigorous analysis, informed by many of the nation's top energy experts. The resulting consensus is a product of detailed technical exploration, substantive debate, and principled compromise. Early on, Commissioners agreed that a strong economy, affordable energy, and adequate energy supplies were essential prerequisites for tackling all other policy objectives; that markets—appropriately regulated—should be relied upon whenever possible to produce the most efficient solutions; that policies must be designed and implemented with great care and due appreciation for

the law of unintended consequences; and that gradual adjustments are generally preferable to dramatic interventions.

Rejecting Myths on the Left and Right. Equally important, Commissioners found common ground in reflecting certain persistent myths—on the left and on the right—that have often served to polarize and paralyze the national energy debate. These include, for example, the notion that energy independence can be readily achieved through conservation measures and renewable energy sources alone, or that limiting greenhouse gas emissions is either costless or so costly as to wreck the economy if it were tried at all. Most of all, Commissioners rejected the proposition that uncertainty justifies inaction in the face of significant risks.

Given current trends, the consequences of inaction are all too clear. Under business-as-usual assumptions, the United States will consume 43 percent more oil and emit 42 percent more greenhouse gas emissions by 2025. At the global level, oil consumption and emissions will grow 57 and 55 percent respectively over the same timeframe and the Earth will be heading rapidly—perhaps in-



Biomass gasifiers could have a huge role in assisting America meet its energy needs.

exorably—past a doubling and toward a tripling of atmospheric greenhouse gas concentrations. In the Commission's view, this is not a scenario that

should inspire complacency, nor is it consistent with the goal of reducing the nation's exposure to potentially serious economic, environmen-

tal, and security, risks.

Policy Criteria. In choosing among a large number of potential policy options, the Commission applied several general criteria, including: economic efficiency; cost-effectiveness and consumer impacts; ability to provide appropriate incentives for future action; flexibility for adjustment in response to further experience, new information, and changed conditions; equity; political viability; and ease of implementation, monitoring, and measurement.

Revenue Neutrality. Another important consideration was impact on the U.S. Treasury. Here the Commission sought to ensure that, as a package, its proposed policies achieved revenue neutrality; that is, they are expected to roughly pay for themselves (see Table 1). Commission estimates suggest that implementing these recommendations will require additional federal outlays of approximately \$36 billion over ten years. To cover those outlays, the Commission outlines proposals that would raise about the same amount

Table 1

A Revenue Neutral Strategy for Investing in Energy Technology Development

The Commission proposes to double current federal spending on energy innovation, substantially expand early deployment efforts for advanced energy technologies, and triple investment in cooperative international energy research. To offset additional costs to the Treasury, the Commission proposes that the federal government each year auction a small percentage of greenhouse gas emissions permits.

Additional Expenditures		Annual	10 Year Total
RD&D	Double current investment	\$1.7 billion	\$17 billion
Incentives for Early Deployment	Coal IGCC, biofuels, advanced nuclear, non-carbon production tax credit (PTC), manufacturer and consumer auto efficiency incentives, Alaska pipeline	\$1.4 billion	\$14 billion
International Cooperation	Triple Current Investment	\$500 million	\$5 billion
Total			\$36 billion
Additional Revenues			
Greenhouse Gas Permit Sales	<ul style="list-style-type: none"> 5 percent permit auction in 2010 with 0.5 percent annual increase starting in 2013 Revenue from expected permit sales under the safety valve 		\$26 billion \$10 billion
Total			\$36 billion

between 2010 and 2020 from the sale of a small portion of emission allowances under the proposed tradable-permits system for greenhouse gases.

Taken together, the Commission's recommendations aim to achieve a gradual but nevertheless decisive shift in the nation's energy policy. Their near-term impacts, by design, will be modest, and some will undoubtedly find them grossly inadequate to the challenges at hand. Others will criticize the same recommendations for going too far, precisely because they initiate a process of long-term change with consequences that no one can fully predict. These refrains are familiar. They characterize the stalemate in views that has too long resulted either in outright gridlock or in a piecemeal, special interest-driven approach to energy policy. These outcomes are no longer acceptable. It is time for the stalemate to end.

For a complete copy of the report, go to www.energycommission.org.

New Economics Foundation Publication—*The Price of Power*

A fast approaching global energy and climate crisis threatens to reverse human development, says a new report, *The Price of Power*, released by the New Economics Foundation. But even a small shift of support away from fossil fuels toward clean renewable energy could save millions of lives and help avert global warming.

The combined spiraling costs of climate change and dwindling supplies of oil mean that without a major shift to renewable energy, internationally agreed targets to reduce poverty will not be met and people in all countries will suffer a progress-reversing energy shock. The growing threat to the conventional energy supply means any long-term efforts to improve the human condition will have

to be linked to renewable energy sources.

The report shows how "business as usual" development strategies that continue to plan to meet expanding energy needs with fossil fuels are self-defeating and doomed to failure. The costs of 'natural' disasters mostly linked to global warming hit \$60 billion in 2003, of which \$15 billion were insured.

The report shows that renewable energy has the potential to more than meet growing global energy demands. Currently renewables account for around 13 percent of global energy supplies but there is technical potential to increase that by around 120 times. Yet a shift to renewables depends on removing distorting subsidies on fossil fuels and proper investment in clean energy.

The report highlights the possibilities of using renewable energy.

At the moment, only one to three per cent out of the \$40 billion spent annually on energy investment in developing countries goes towards renewables.

Indoor pollution accounts for 2.2 million deaths and costs the world between \$150 billion and \$750 billion per year—0.5 to 2.5 per cent of the world's GNP—mainly in lost production through sickness and death. But by spending just five per cent of their total annual overseas aid budget on clean-technology stoves for poor households, OECD nations could help save over 25 million lives over the next decade.

All of non-electrified Sub-Saharan Africa could be provided with energy from small-scale solar facilities for less than 70 per cent of what the wealthy OECD countries spend on subsidising dirty energy every year.

One year's worth of World-Bank spending on fossil fuel projects, if redirected to small-scale solar installations in Sub-Saharan Africa, could provide ten million people on the continent with electricity. And, the an-

nual amount tied to investments in coal, oil and gas projects in the developing world between 1992 and 2002 by US agencies could have provided over 30 million people in Sub-Saharan Africa each year with solar electricity.

One year's worth of global fossil fuel subsidies could comfortably pay off Sub-Saharan Africa's entire international debt burden with billions left over.

Under business as usual, global oil use and economic growth are interdependent. Threats to oil supply, either in terms of price or simple availability, mean the global economy going 'cold turkey'. Once oil production peaks - a point many analysts believe we are on the cusp of - prices begin to rise sharply, with the heaviest burden falling on the poorest countries, while developed nations are already experiencing fuel price riots.

The report shows that subsidies to coal, oil and gas, measured conservatively at around \$235 billion per year directly distort the global economy and hold back the development of renewables. The energy industry is further skewed by the fact that the direct costs of damage by carbon emission - estimated by the British government at between £50 and £200 per tonne - are not factored into the price of fossil fuels.

Andrew Simms, nef Policy Director said, "Around the world control of fossil fuels is linked to corruption and violence. Burning them causes climate change which in turn puts an impossible obstacle in the way of ending poverty. Reshaping our energy supply holds the secret to ending poverty and preventing global warming. Small-scale renewables remain the best answer for communities and the environment."

The capital requirements of renewables can also be lower than those of conventional and centralized investments. The report highlights the diversity, flexibility and potential of re-

MARK YOUR CALENDAR!

SOUTHERN BIO-PRODUCTS CONFERENCE

March 22-23, 2005

Holiday Inn – Jackson North

5075 I-55 North

Jackson, Mississippi 39206

Please join the Mississippi Biomass Council and sponsors at the 2005 Southern Bio-Products Conference. This program focuses on products produced from biomass material and will include research papers, updates on important federal bio-programs, equipment and service exhibitors, and discussion of the latest commercial technologies.

The conference will have a General Session on March 22 including new developments in federal bio-programs. Also, a tour of the Nissan North America, Inc. Plant is scheduled.

RESERVE YOUR SEAT TODAY!

Space is limited to 45 people and the cost is \$45.00 per person.

Concurrent Technical Sessions on March 23 will focus on:

Feedstock Management

Biofuels

Alternative Chemicals

Polymers

Green Power

Other Products

FOR MORE INFORMATION, CONTACT:

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Mississippi State University Industrial Outreach Service

Alcorn State University Small Farm Development Center

newable energy sources, including:

In India a pilot project in Bhopal, a city still suffering the after affects of its lethal chemical encounter with development, is providing cleaner and cheaper lighting for street vendors with solar lanterns.

In Kenya, a switch from charcoal to environmentally friendly briquettes means a saving of 33 per cent on energy bills.

In Mongolia, small household-scale wind turbines have added up to US\$30-US\$150 in income per month.

In Bangladesh, community solar-powered cell phones have produced up to US\$200 per month in revenue for women who primarily operate the phones in their homes.

The report calls for the official adoption of key targets for the uptake of renewable energy including:

Implement the G8's target of serving at least one billion people globally with renewable energy by 2010, phase out government subsidies for fossil fuels and nuclear energy.

Reform the International Financial Institutions and Export Credit Agencies to dramatically increase funding for renewable energies in developing countries. Phase out World Bank Group subsidies to fossil fuel projects by 2008 in line with the recommendations of its Extractive Industries Review.

Increase the target of access to clean energy to two billion on the world's poorest people over the next ten years.

To download a copy of the full report go to www.neweconomics.org, click on "publications" and do a search for The Price of Power.

(The New Economics Foundation (NEF), based in London, was founded in 1986 by the leaders of The Other Economic Summit (TOES), which forced issues such as international debt onto the agenda of the G7 and G8 summits. NEF is an independent think-and-do tank that in-

spires and demonstrates economic well-being. NEF works on specific project areas through practical pilots and tools for change, in-depth research, campaigning, and policy discussion. NEF works with all sections of society in the UK and internationally - civil society, government, individuals, businesses and academia - to create more understanding and strategies for change. They are located at 3 Jonathan Street, London, SE11 5NH.)

Funding Sources

NYSERDA Announcement: Renewable Resource Development Program, Program Opportunity Notice (PON) No. 787. Up to \$4,000,000 available. Proposal due dates: Round One: July 19, 2004 by 5pm; Round Two: January 17, 2005 by 5pm.

Program Description:

The New York State Energy Research and Development Authority (NYSERDA), as administrator of the New York Energy SmartSM program, seeks proposals for site-specific pre-development activities that will foster the development of a broad range of promising renewable energy technologies in New York. Success of the program will be measured by an increase in the amount of energy production potential from various renewable generating projects and technologies.

Under this program, NYSERDA intends to support projects involving the use of renewable energy and fuels for power production. Such projects can include: (a) pre-developing specific sites for renewable energy generation (i.e. wind, solar, hydro, landfill gas, biomass), (b) pre-developing specific sites for the growth, extraction/harvesting and management of renewable fuels/feed stocks that will be used to produce electricity (i.e. biomass), or (c) developing, demonstrating or improving energy conversion/production tech-

nologies involving the use of eligible renewable fuels. The intent is to develop an inventory of sites, fuel supplies, technologies and business entities that together would facilitate the building and operation of renewable generating resources in New York State. NYSERDA does not intend to offer direct financial production incentives or subsidies for installation and operation of renewable generation through this program.

Eligibility for awards under the program will be a function of several criteria related to such things as, but not limited to, time-to-commercialization, power production potential, environmental and economic benefits, and the ability for replication across New York State. Several proposal types are expected under this program. Two rounds under this program are scheduled. Total available NYSERDA funding is \$4,000,000 and proposals will be accepted by NYSERDA on July 19, 2004 and again on January 17, 2005. All, or none, of the available funds could be allocated in either round. Maximum NYSERDA funding per proposal will be \$200,000, with no more than 50% of the cost of each selected project to be supported by NYSERDA funds.

To receive a full solicitation, including program requirements and instructions for preparing a proposal, visit the NYSERDA website - www.nyserda.org/rddopps.html; or submit your request via fax, email or mail to the address below. Indicate you are requesting PON 787. Karen Whalen, PON No. 787, NYS Energy Research and Development Authority, 17 Columbia Circle, Albany, NY 12203-6399; email kew@nyserda.org; fax +1 (518) 862-1091. Technical questions should be directed to Jeffrey Peterson at +1 (518) 862-1090, ext. 3288, or jmp@nyserda.org; contractual questions should be direct to Diane Vogel at +1 (518) 862-1090, ext. 3299, or drv@nyserda.org.

Position Announcement
Campaign Coordinator — Climate Center
Natural Resources Defense Council

The Natural Resources Defense Council (NRDC), a not-for-profit environmental organization, is seeking a highly-qualified and motivated individual to coordinate public outreach efforts for advocacy campaigns. This position will be part of the Climate Center, a team within the organization working on promoting policy and technology solutions to global warming. The position provides a unique opportunity to engage and educate opinion leaders, the public, decision makers and other public interest organizations on the need to control emissions that are responsible for global warming.

Qualifications for this position are 3-5 years of experience working on issue advocacy or public education campaigns. Knowledge of energy and/or climate policy preferred, but not required. S/he will be responsible for implementing campaign strategy including research, coalition building, and developing materials for public communication purposes. In particular, the position will be responsible for identifying, developing and maintaining partnerships with strategically important constituencies including but not limited to religious, environmental justice and outdoor recreational users. A successful candidate must have excellent interpersonal skills, possess superior professional written and public communications skills, and demonstrate an ability to think strategically and implement a targeted communications program. A high level of computer and Internet literacy is required.

NRDC has over 200 staff people in four offices in the U.S. This position is located in their Washington, DC, office. They offer competitive salaries, good benefits and an excellent working environment. Women and people of color are encouraged to apply. Send resume to: HR_DC@nrdc.org.

Title: Renewable Energy Certificates - NASA Johnson Space Center; Number: SP0600-05-R-0027; Issue Date: 12/10/2004; Description: Renewable Energy Certificates (RECs), for ultimate transfer to NASA Johnson Space Center, located in Houston, Texas. Contracts are anticipated for a 2-year period commencing February 1, 2005 and ending on January 31, 2007. Line item quantities can be found in the schedule contained in the solicitation.

Additional Information: Receipt of offers is due January 11, 2005, 12:00 Noon, local Fort Belvoir time. Price closing is scheduled for January 25, 2005, 12:00 Noon, local Fort Belvoir time. Contract Specialist: Simpson, Leslie Phone: +1 (703) 767-8531; Email: leslie.simpson@dla.mil. Contracting Officer, Kincaid, Andrea, Phone: +1 (703) 767-8669; Email: andrea.kincaid@dla.mil. For a copy

of the full solicitation go to <http://www.desc.dla.mil/DCM/DCMSolic.asp?SolicID=809>.

The US EPA Office of Solid Waste and Emergency Response (OSWER) has issued a solicitation that includes CHP projects that are fueled by waste products or recovered energy. Please note that this solicitation is limited to public authorities, agencies and institutions; non-profit organizations and agencies; academic institutions; and federally recognized Tribes. The US EPA Office of Solid Waste and Emergency Response (OSWER) set aside a limited amount of funding for regional and HQ program offices to develop new and creative approaches addressing OSWER's key priorities. EPA anticipates at least \$500,000 will be available to fund creative proposals testing innovative approaches to waste minimization, energy recov-

ery, recycling, restoring contaminated sites, and homeland security related to chemical emergency, preparedness, and response that may be replicated across various sectors, industries, communities, and regions. EPA anticipates selecting between 12-20 proposals. Proposals can be submitted by EPA employees in OSWER headquarters or regional offices; public authorities (Federal, State, interstate, intrastate, and local); public agencies and institutions; nonprofit private organizations, agencies, and institutions; academia; and federally recognized Tribes. All funds allocated under this program can be placed into Interagency Agreements (IAGs), contracts, cooperative agreements, or grants, depending upon the principal purpose of the transaction. A template is available for download to aid applicants in the development of proposals. Up to

\$75,000 can be requested per pilot; however, the average funding per pilot is \$47,000. Proposals are due January 14, 2005. For more information and application instructions, visit <http://www.epa.gov/oswer/iwg/announcement.htm>. To download the template, visit <http://www.epa.gov/oswer/iwg/template.htm>.

Ohio Department of Development Distributed Energy Resources Grant Solicitation. On November 29, the Ohio Department of Development's Office of Energy Efficiency released a request for proposals (RFP) for distributed energy resources project grants financed through the Energy Loan Fund including but not limited to heat recovery, combined heat and power, landfill or biomass methane for electric generation, and solar and wind electric generation. Deadline to submit proposals, 3pm EST, January 31, 2005. Proposal review/grant award announcements, March 31, 2005. For additional information, go to <http://www.odod.state.oh.us/cdd/oeel/ELFGGrant.htm>.

Ivanhoe Energy to Acquire 100% of Ensyn Group and its Heavy-oil Upgrading Technology

Ensyn Group Inc (Ensyn Group) is pleased to announce that it has signed a definitive merger agreement with Ivanhoe Energy Inc. (NASDAQ: IVAN and TSX: IE, IE.U), in which Ivanhoe will acquire 100% of Ensyn Group for a total consideration of US\$85 million. Prior to completing the merger, Ensyn Group will spin off its existing biomass processing business, Ensyn Renewables Inc., to its shareholders, leaving as its key asset the 85% of Ensyn Petroleum International Ltd. (Ensyn Petroleum) that Ivanhoe does not already own. With this purchase, Ivanhoe will gain full ownership of Ensyn Petroleum and its advanced "RTP™" heavy oil

upgrading technology for the development of heavy-oil reserves around the world. The RTP™ technology was conceived and developed in Canada, by Ensyn Technologies Inc., a subsidiary of Ensyn Group that is based in Ottawa. The early application of RTP™ to heavy oil upgrading was focused on Western Canadian reserves, and this transaction will further expand commercial development worldwide.

Under the merger agreement, Ivanhoe will acquire all of the outstanding shares of Ensyn Group, and through a series of transactions, Ensyn Petroleum will become a wholly-owned subsidiary of Ivanhoe. Ivanhoe will pay \$85 million for all of the outstanding shares of Ensyn Group, consisting of Ivanhoe Energy common shares and cash. Ivanhoe acquired an initial 10% stake in Ensyn Petroleum in December 2003, and acquired an additional 5% stake in August 2004.

Ottawa-based co-founder, Chairman and CEO of Ensyn, Dr. Robert Graham, was pleased to note that a Canadian technology had attracted such commercial interest internationally over the past few years, and commented, "We believe Ivanhoe is the perfect complement for us at this time. Their senior management team has decades of experience in building reserves around the world utilizing leading-edge technologies. Ensyn's RTP™ heavy oil upgrading process represents a breakthrough in heavy oil processing, and Ivanhoe shares our vision on how to build value with this technology."

Ensyn and Ivanhoe have been working together for nearly 18 months. Ivanhoe Chairman David Martin commented, "I believe there is tremendous potential for the application of Ensyn's proprietary technology in developing heavy-oil deposits around the world. There is an abundance of untapped heavy oil and bitumen deposits worldwide. The de-

velopment of heavy oil is in the initial stages of enormous growth, fueled by advances in heavy-oil technology and declining reserves of light oil and natural gas. Ensyn's technology has significant potential to address a number of the existing technical and economic challenges in heavy oil development. Our investment in Ensyn will provide Ivanhoe with a unique global technology platform to significantly increase our base of oil and gas reserves worldwide."

Ivanhoe has prior agreements in place to deploy Ensyn's RTP™ technology in the development of heavy oil fields in several countries in the Middle East and South America. This acquisition now gives Ivanhoe the ability to leverage the RTP™ upgrading technology to significant opportunities in other countries with heavy oil deposits, including the world-class resources in Venezuela, Canada and the United States. In addition, Ivanhoe will continue with initiatives that Ensyn has been developing, including the advancement of negotiations for a 10,000-barrel-per-day RTP™ plant in California. Aera is a California limited liability company owned by affiliates of Shell and ExxonMobil, and is California's leading oil producer with about 250,000 barrels per day of oil production.

Ensyn's Rapid Thermal Processing (RTP™) technology is a field-located oil processing technology used to upgrade heavy oil to produce lighter, more valuable crude oil at lower costs and at lower scale than conventional technologies. The upgraded heavy oil, similar to less viscous conventional light crude oil, brings a higher price and can be easily transported. In addition to a significant improvement in oil quality, an RTP™ facility can yield large amounts of surplus energy for production of steam and electricity used in heavy-oil production. The thermal energy from the process provides heavy-oil producers with an alterna-

tive to high-priced natural gas that now is widely used to generate steam. "The technology offers an excellent opportunity to optimize the development of mature heavy oil fields and enables the development of "stranded" heavy oil deposits," commented Dr. Graham.

Several key Ensyn personnel who developed the RTP™ technology and founded Ensyn are expected to join, or be contracted to, Ivanhoe following the acquisition to continue to advance the technology. They include the key technical staff and individuals that have been leading the commercial development. Dr. Robert Graham, President and CEO and Robert Pirraglia, COO of Ensyn Group respectively will join the Ivanhoe Board of Directors, but will otherwise be continuing to carry out their full time executive responsibilities at Ensyn Renewables Inc. Mr. Barry Freel, Ensyn's Vice President and Chief Technology Officer, will share his technical duties between the two firms for a period of time.

Under the terms of the merger agreement Ivanhoe will pay \$10 million in cash and issue Ivanhoe common shares valued at \$75 million based on a trailing, weighted, 10-day average of Ivanhoe's closing share price on the NASDAQ prior to the closing of the transaction, subject to a minimum issuance of 30 million common shares. The Boards of Directors of both Ivanhoe and Ensyn Group have approved the merger transaction. The merger transaction will require the approval of Ensyn shareholders and may require the approval of Ivanhoe shareholders, depending on the number of common shares Ivanhoe is required to issue. The merger transaction is also subject to applicable regulatory approvals.

Closing of the transaction is expected to occur early in the second quarter of 2005, following regulatory approvals and after Ensyn has satis-

fied Ivanhoe's defined performance criteria and parameters for the commercial demonstration facility in California. These performance criteria relate primarily to upgraded product yields and end-product quality and values, as well as the quantity of surplus energy generated.

Ensyn Group, Inc., the parent company of Ensyn Petroleum International Ltd., is a privately held company with two principal subsidiaries, each applying the same core RTP™ technology to different feedstock. Ensyn Renewables Inc. produces fuels and chemicals from biomass and other renewable resources, while Ensyn Petroleum International Ltd. Upgrades heavy oil and bitumen. Ensyn Renewables has operated commercial facilities since 1989 and has six commercial biomass facilities in operation, with a seventh under construction. Ensyn Petroleum has been testing its patented RTP™ technology on heavy crude oils from around the world at its Canadian pilot facility since 1998. Dr. Robert Graham, a founder of Ensyn, is Ensyn Group's largest shareholder, followed by Credit Suisse First Boston who holds approximately 19% of its common shares.

For more information, contact Mr. Ian Barnett at info@ensyn.com.

New Tool Available to Estimate the Benefits of Tree Planting

This spring the American Public Power Association (APPA) launched its Web-based "Tree Benefits Estimator" to help its members estimate the environmental benefits of planting trees. The estimator allows utilities and individuals to estimate energy savings, demand reduction, and greenhouse gas emissions reductions achieved by planting trees.

The estimator was created as part of the Association's national tree-planting program, TREE POWER, to

help public power utilities analyze the effectiveness of their environmental efforts.

Created in 1991, TREE POWER promotes community tree-planting programs. Its 233 public power system participants serve 8.9 million customers, or nearly half of public power's customer base.

Available to the public, the Tree Benefits Estimator was developed for APPA by staff of the Sacramento, California, Municipal Utility District (SMUD). SMUD is renowned for its shade tree program that since 1990 has planted more than 350,000 trees.

All are encouraged to make use of the estimator, which is located on APPA's web site. From the APPA home page, www.APPAnet.org, choose "Special Utility Programs" from the top horizontal bar, then choose "TREE POWER."

For more information on TREE POWER or the Tree Benefits Estimator contact treepower@appanet.org or by phone at +1 (202) 467-2952.

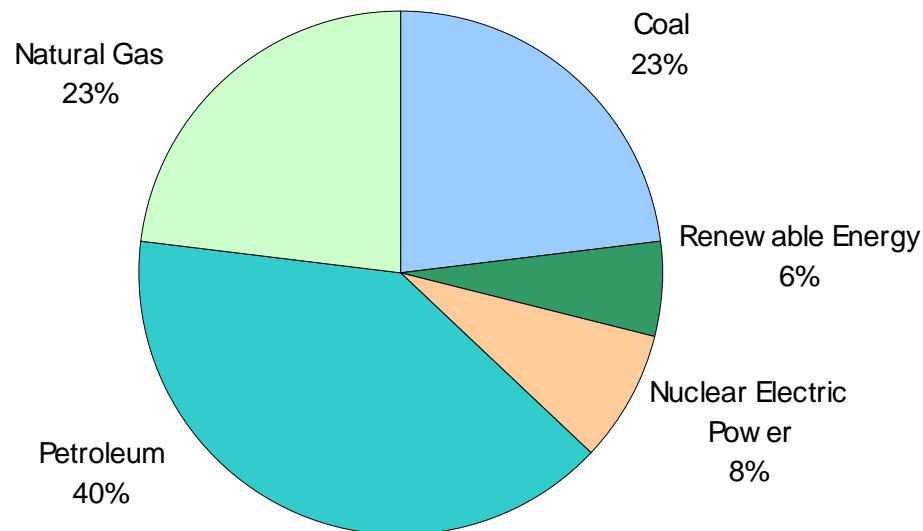
DEED Reports Available from Sponsored Grant Programs

Following are summaries of reports available from DEED sponsored grant programs. To obtain copies of the reports contact DEED Grab Bag, 2301 M Street, NW., Washington, DC 20037, fax +1 (202) 467 2992 or email DEED@APPAnet.org.

Generating Electricity from Sewage Sludge and Digester Gas. Manitowoc Public Utilities (MPU) undertook and completed a study to ascertain the feasibility of co-firing sewage sludge and digester gas from a nearby Waste Water Treatment Plant (WWTP) owned by the city of Manitowoc, and supplying the WWTP with steam from MPU's cogeneration plant. Three separate options were studied.

Research and Analysis of Greenhouse Gas Strategies for Public

The Role of Renewable Energy Consumption in the Nation's Energy Supply, 2003



Information from the EIA "Renewable Energy Trends 2003" report.

Power Utilities. This project, conducted by Adam Newcomer, a student at the University of Texas, analyzes the impact of current greenhouse gas (GHG) proposals on utilities. Sponsored by the Lower Colorado River Authority, the report looks at cost effective and near term GHG reduction strategies for public power utilities.

Technical Assessment of Municipal Solid Waste Gasification. Alameda Power and Telecom assessed Municipal Solid Waste (MSW) as a viable source of electric generation and future supply needs. The study researched the technical viability as well as the economic attractiveness of using thermal MSW gasification as a source of power for small municipal utilities.

New EIA Data for Biomass Energy

The US Energy Information Administration (EIA) has released a report entitled "Renewable Energy Trends 2003," containing useful data about national and state level renewable energy consumption.

The report notes that renewable energy contributed 6 percent of the total energy supply for the United States in 2003, which is a 3 percent increase to 6.1 quadrillion Btu from the previous year. While more than half of the growth came from a 4 percent increase in hydropower, most of the remaining growth came from a 3 percent increase in biomass. Biomass consumption in the residential and transportation sectors grew 15 and 41 percent, respectively. Ethanol use increased substantially from 133 trillion Btu in 2001 to 156 trillion Btu in 2002, and grew to 220 trillion Btu in 2003. This increase is

largely due to its use as an oxygenate in reformulated gasoline and the declining use of the oxygenate additive MTBE.

Industrial and electric power sector biomass consumption accounts for more than three-fourths of total biomass consumption, yet biomass consumption declined 1 and 2 percent in 2003, respectively, compared to 2002 in these sectors. Ninety-five percent of the industrial sector consumption of renewable energy was wood and wood waste biomass.

While other renewable sources are largely used to generate electricity, twice as much biomass was used for space, steam, and process heat quads as was used for electricity production in 2003. The industrial sector is the greatest user of process heat and steam, and 59 percent of total biomass was consumed by this sector in 2003. Ninety-six electricity generating plants burned both

biomass and coal in 2002 in 26 states, although none were in Ohio.

The document reports the following renewable market shares of net electric generation for the Great Lakes program states in 2002: Illinois (0.4), Indiana (0.1), Iowa (2.4), Michigan (2.1), Minnesota (3.9), Ohio (0.1), and Wisconsin (2.0).

To view the "Renewable Energy Trends 2003" report, visit the EIA web site at www.eia.doe.gov/fuelrenewable.

Additionally, the PUCO offers the quarterly publication "Ohio Energy Data Report" which contains information about the production, consumption, and price of energy in Ohio. This report is available on the PUCO web site at www.PUCO.ohio.gov in the electric and natural gas sections.

EERC Project Generating Electricity with Biomass Is First of its Kind in the U.S.

The University of North Dakota (UND) Energy & Environmental Research Center (EERC) has successfully generated electricity from biomass with an exciting, cost-effective gasification technology in a diesel engine. Biomass includes forest residues, wood chips, sawdust, and agricultural by-products.

This fall, the EERC has completed over 100 hours of continuous operation of a biomass gasifier firing wood chips. The process converts wood chips into gas (similar to natural gas) that can be fired in a small gas turbine (microturbine), diesel, or conventional combustion engine. The technology can run automatically, providing a clean, quality gas for power generation. This gas was successfully utilized to operate a 100-horsepower John Deere diesel engine and conduct emission testing.

"We believe this demonstration project utilizing biomass to produce a gas that is burned in a diesel engine is the first of its kind in North

America," said Darren Schmidt, EERC Research Manager in charge of the project.

"The major opportunities for this technology are at remote sites where it's difficult to bring in fuels, such as many Indian reservations in the West," said EERC Director Gerald Groenewold. "This provides many exciting opportunities for enhancing national energy independence and could significantly reduce the use of landfills," Groenewold said.

Project sponsors include the U.S. Department of Energy; the California Energy Commission; FlexEnergy; the North Dakota Department of Commerce Division of Community Services; Primeboard, Inc.; the Biomass Energy Resource Center; the National Renewable Energy Laboratory; and the Massachusetts Technology Collaborative.

To further demonstrate and support commercialization of the technology, the EERC and its commercial partners are seeking partnerships with industries interested in biomass management and demonstrating the technology at forest product sites around the country.

The EERC operates essentially as a high-tech business within UND, allowing great flexibility to quickly craft teams and provide timely technical answers to address critical worldwide energy and environmental issues. Since 1987, the EERC has established working relationships with more than 780 clients from the public and private sectors in all 50 states and 47 countries around the world.

For more information contact: Darren Schmidt, EERC Research Manager at +1 (701) 777-5120, dschmidt@undeerc.org, or Tom Erickson, EERC Associate Director for Research, at +1 (701) 777-5153, terickson@undeerc.org.

Canadian Working Papers

The Canadian Energy Research Institute (CERI), in partnership with the University of Alberta, the University of Calgary and the Centre for Energy, has established a repository of Working Papers on Energy, Environment and the Economy. The papers will be hosted electronically by the Centre for Energy on the Centre's web site: www.centreforenergy.com.

The working papers are being solicited directly through Canadian academic institutions and indirectly through various professional organizations. The working papers series is supervised by a steering committee that includes representatives of the partner institutions. All papers from academics and professionals will be accepted. In doubtful cases members of the series' steering committee will be consulted.

The papers will be accessible to the public as soon as the first papers are received. Please submit your papers to: Daniel Czamanski, Ph.D. Senior Vice President Canadian Energy research Institute email: dczamanski@ceri.ca Direct: +1 (403) 220-2372.

U.S. Ethanol Industry Produces All-Time Monthly Record in September

The Renewable Fuels Association (RFA) recently announced that the U.S. ethanol industry set an all-time monthly production record in September of 226,000 barrels per day (b/d), according to data released by the U.S. Energy Information Administration (EIA). Production was up 19 percent compared to last September when 190,000 b/d of ethanol were produced. The previous all-time monthly record of 225,000 b/d was set in August of this year.

The ethanol industry is expected to produce more than 3.35 billion gallons in 2004, up from 2.81 billion gallons in 2003. Currently, 82 etha-

nol plants nationwide have the capacity to produce nearly 3.5 billion gallons annually. There are 16 ethanol plants under construction with a combined annual capacity of over 750 million gallons.

For more information, visit www.ethanolRFA.org.

H2WORLD Keeps You Informed on Hydrogen

In October of this year a new magazine was launched: *H2World*, the *European Journal for Sustainable Hydrogen*.

H2World is the first European magazine aimed specifically on the Hydrogen value and business chain.

Its content includes expert opinions, discussions on political issues and in-depth articles on technology and marketing of Hydrogen. The *Journal* gives reliable, in-depth information on relevant developments in technology, politics, markets and new applications.

For more information visit www.h2world.nl.

Delaware Governor Breaks Ground on Biodiesel Production Facility

(Opening of Mid-Atlantic plant signifies growing biodiesel industry)

Mid-Atlantic Biodiesel, Inc., will become the first biodiesel manufacturing plant in the Mid-Atlantic region, Governor Ruth Ann Minner announced at its groundbreaking Sept. 20. The five million gallon capacity plant in Clayton, Del., will be one of approximately 20 dedicated biodiesel plants nationwide, with more than 20 others planned by various private companies and farmer co-ops.

"Biodiesel fuel provides important contributions to the quality of life we enjoy here in Delaware," said Governor Minner. "As a replacement for petroleum diesel, biodiesel reduces greenhouse gas emissions and other

pollution, improving the air that we breathe," she said.

The groundbreaking event featured representatives from the Delaware Department of Agriculture and the Delaware Soybean Board, who cosponsored the event hosted by Delaware's Secretary of Agriculture, Michael Scuse, a soybean farmer. The Small Business Administration, as well as state agencies that use biodiesel, private industry and academia were also in attendance. The plant groundbreaking also received support from neighbor states like Maryland.

Biodiesel is a renewable fuel made from fat or vegetable oil, like that from domestically produced soybeans, which can be used in any diesel engine with few or no modifications. It offers enhanced lubricity and cetane, plus similar horsepower and torque when compared to petroleum diesel. Since it is domestically produced and renewable, it also contributes to national energy security. More than 400 major fleets use biodiesel commercially nationwide including all four branches of the military, NASA, Harvard University, the National Park Service, U.S. Postal Service and others. About 300 retail filling stations make various biodiesel blends available to the public, and more than 1,000 petroleum distributors carry it nationwide.

Speaking on behalf of Mid-Atlantic Biodiesel, Martin Ross, President of the company, Delaware farmer and a National Biodiesel Board (NBB) director, thanked Governor Minner for her leadership in support of biodiesel. "Without your commitment to this project, I don't believe the facility would be possible," he said. "Our biodiesel's marketing potential is excellent, and we have secured a commitment from a company eager to purchase our production," he said.

NBB has honored Governor Minner in the past for her commitment to increasing the use and availability of

the fuel in the state. "This new biodiesel production facility in the mid-Atlantic region will provide increased access to a new source of fuel in a key area of the country, which includes our nation's capitol and the many government and private transportation fuel users in the central region and along the Atlantic seaboard," said Joe Jobe, NBB Chief Executive Officer. "We commend Delaware soybean farmers - and their dedication to the soybean checkoff program - and Governor Minner for their leadership in biodiesel development." John Becherer, CEO of the United Soybean Board, which oversees the investments of the soybean checkoff on behalf of nearly 600,000 U.S. soybean farms, also attended the event.

The LLC is set to go on line in September or October of 2005. Two-thirds of Delaware farmers grow soybeans, according to the Delaware Soybean Board and Delaware Department of Agriculture.

Biodiesel is the only alternative fuel to have completed the rigorous Health Effects testing requirements of the Clean Air Act. Biodiesel is non-toxic, biodegradable and essentially free of sulfur and aromatics. It significantly reduces emissions of carbon monoxide, particulate matter, unburned hydrocarbons and sulfates. On a lifecycle basis, biodiesel reduces carbon dioxide by 78 percent compared to petroleum diesel, making it the most effective greenhouse gas mitigation technology currently available for heavy-duty vehicles and equipment.

Biodiesel is now available commercially at four public fueling stations in Delaware and through several fuel providers throughout the state.

For more information, visit www.biodiesel.org, or contact Jenna Higgins, National Biodiesel Board, +1 (573) 635-3893. or 1-800-841-5849.